



Biochemical and histological contributions to textural changes in watermelon fruit modulated by grafting



Georgios A. Soteriou^a, Anastasios S. Siomos^b, Dimitrios Gerasopoulos^b, Youssef Rouphael^c, Soteria Georgiadou^d, Marios C. Kyriacou^{a,*}

^a Postharvest Technology Laboratory, Agricultural Research Institute, Nicosia, Cyprus

^b Aristotle University of Thessaloniki, 54124 Thessaloniki, Greece

^c Department of Agricultural Sciences, University of Naples Federico II, 80055 Portici, Italy

^d National Reference Laboratory for Animal Health, Histopathology Section, Veterinary Services, Nicosia, Cyprus

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Lycopene (PubChem CID: 446925)

Fructose (PubChem CID: 5984)

Glucose (PubChem CID: 79025)

Sucrose (PubChem CID: 5988)

Galacturonate (PubChem CID: 841573)

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ABSTRACT

Increased watermelon fruit flesh firmness is systematically incurred with grafting on *Cucurbita* hybrid rootstocks (heterografting). Possible differences in mesocarp cell wall constitution and histology between heterografted, homeografted (self-grafted) and non-grafted watermelon were examined, as well as their contributions to fruit texture. Firmness correlated positively ($r = 0.78$, $p < 0.001$) with cell density (cells mm^{-2}) which was higher in heterografts (5.83) than homeografts (4.64) and non-grafted controls (4.69). Mean cell size was smallest in heterografts and correlated negatively ($r = -0.75$, $p < 0.001$) with firmness. Cell wall material, particularly the water-insoluble pectin fractions associated with firmness, were highest in heterografts. No associations with firmness were found for cell wall neutral sugars and membrane permeability. Higher parenchymatic cell density with higher content of alcohol insoluble residue and more abundant water-insoluble pectin fractions underscore enhanced firmness in heterografts. Possible implication of osmolytes in rootstock-mediated cell pressure regulation warrants further investigation.

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